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ABSTRACT

This learning module provides students with practice in applying mathematical operations to vocational agriculture. The module consists of unit objectives, definitions, information, problems to solve, worksheets suitable for various levels of vocational agriculture instruction, and answer keys for the problems and worksheets. This module, which covers ratios and proportions, provides practice in using ratios and proportions and partitive proportions to solve problems in agriculture. Practical applications include computing interest on loans, and determining the storage cost of farm products. (KC)

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RATIOS AND PROPORTIONS

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TEACHING UNIT: **RATIOS AND PROPORTIONS**

TEACHING ACTIVITIES: (1) Ratios
(2) Proportions
(3) Partitive Proportions

UNIT OBJECTIVES: (1) To provide experiences which will enable students to develop an understanding of how to use basic computational skills to solve problems involving ratios and proportions.

(2) To present arithmetic concepts of working with ratios and proportions in a manner keeping with the interest of vocational agriculture students.

DEFINITIONS:

Ratio - A ratio expresses the relationship betwen the numbers of two sets. The ratio of two numbers may be written with a "colon," "1:2", with the word "to", 1 to 2; or with a fraction bar, 1/2. All the notations indicate that the ratio is actually a comperison by division. When comparing quantities with units in ratio form, the quantities must be expressed in the same unit of measurement.

Proportion - A proportion is an expression of equality between two ratios. An example of a proportion would be, "1/2 = 4/8". This proportion could also be written as "1 is to 2 as 4 is to 8". Proportions may also be written by using colons; "1/2 = 1/4" would be written as "1:2::4:8". To solve a proportion, the expression should be written as a fractional equation and solved arithmetically by using cross multiplication.

Example: 3 is to x as 5 is to 25;

$3/x = 5/25$;

$5x = 75$

$x = 15$

Partitive Proportions: Partitive proportions are used to divide a quantity into units that are the same ratio to each other when there are more than two ratios being considered. Paritive proportions are solved by suming all ratio units and then setting up a proportion with each ratio.

Example: Assume that 48 is to be divided into four parts portional to the number series "2:4:6:8". To solve, add "2","4","6" and "8" to get 20 parts. Then set up a proportion with each of the four numbers.

$2/20 = x/48$ $\quad$ $4/20 = x/48$

$20x = 96$ $\quad$ $20x = 192$

$x = 4.8$ $\quad$ $x = 9.6$

$6/20 = x/48$ $\quad$ $8/20 = x/48$

$20x = 288$ $\quad$ $20x = 384$

$x = 14.4$ $\quad$ $x = 19.2$

To check add all parts to see if they equal 48.

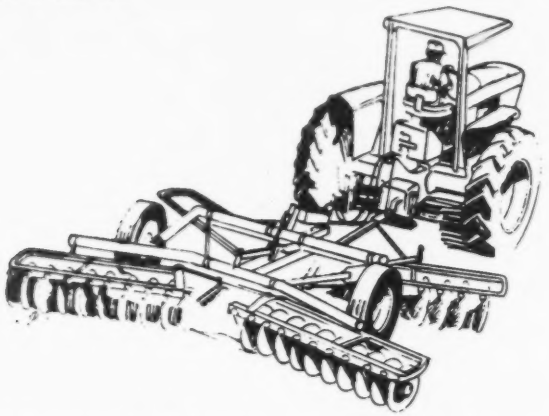
$4.8 + 9.6 + 14.4 + 19.2 = 48.$

NAME _____

INSTRUCTIONS: SOLVE FOR THE VARIABLE IN THE FOLLOWING PROBLEMS.

(1.) If a merchant must pay $210 for 10 cases of eggs, how much would 12 cases cost? $ _____

(2.) Two pounds of ground beef cost $1.60. At this rate, what would 30 pounds of beef cost? $ _____



(3.) John disked 3 acres in 2 hours. At this rate, how many acres can he disk in 12 hours? $ _____

(4.) John, Joe and Sally put their money together and built a road side stand. During the summer they earned a profit of $4,450. The profit is to be divided into proportional parts with John receiving 2 parts, Joe receiving 6 parts, and Sally receiving 8 parts. How much should each individual receive?

John: $_____ Joe: $_____ Sally: $_____

(5.) A farmer harvested a combined total of 3,400 bushels of grain. If the harvest represented 2 parts wheat, 6 parts soybeans and 9 parts corn, how many bushels of each crop were harvested?

wheat = _____ bu. soybeans = _____ bu. corn = _____bu.

(6.) A family farm which is 720 acres total consists of 3 parts woodland, 6 parts pasture, 8 parts cropland and 1 part for the house and outside buildings. How many acres of land are in each part of the farm?

woodland = _____ acres pasture = _____ acres

cropland = _____ acres house and buildings = _____ acres

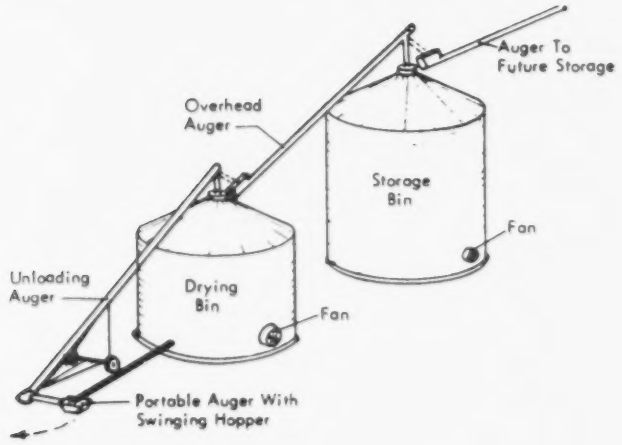
Name _____

WORKSHEET

COURSE: **Agricultural Production III**

COMPETENCY: #017 - "Determine the storage cost of farm products"

INSTRUCTIONS: Complete the following problems.



NOTE: THE ABOVE GRAIN SYSTEM WAS INSTALLED FOR STORING CORN. THE DRYING BIN IS 18 FEET IN DIAMETER AND IS CAPABLE OF DRYING AND STORING UP TO 1850 BUSHELS OF CORN BY THE STIR DRYING METHOD. THE STORAGE BIN IS 30 FEET IN DIAMETER AND IS CAPABLE OF STORING 9250 BUSHELS OF GRAIN. THE TOTAL COST OF THE SYSTEM INSTALLED WAS $13,320.

1. How many acres of corn can be dryed and stored in the above system, including storage in drying and storage bins, if the average yeild per acre is 120 bushels? _____ acres.

2. If the farmer fills the system to capacity each year at harvest time, and sells the grain the next Spring when prices are higher, how much more money per bushel must he/she average receiving in order to recover the cost of the system in 5 years? $_____.

Name _____

WORKSHEET

COURSE: **Agricultural Production III**

COMPETENCY: #023 - "Compute interest on long and short term loans"

INSTRUCTIONS: Using the information in the Chart below, solve the following problems.

Conventional Loan Payment Schedule
Monthly Payment Necessary on a $1,000 Loan

YEARS	6%	7%	8%	9%	9.5%	10%
3	30.43	30.88	31.34	31.80	32.08	32.27
4	23.49	23.95	24.41	24.89	25.13	25.37
5	19.34	19.80	20.28	20.75	21.01	21.25
10	11.11	11.60	12.13	12.67	12.94	13.22
12	9.76	10.28	10.82	11.38	11.67	11.96
15	8.44	8.99	9.56	10.14	10.45	10.75
20	7.17	7.75	8.36	9.00	9.33	9.66
25	6.45	7.07	7.72	8.39	8.74	9.09
30	6.00	6.65	7.34	8.05	8.41	8.78
35	5.71	6.39	7.11	7.84	8.22	8.60
40	5.51	6.22	6.96	7.72	8.11	8.50

1. If a farmer purchases a new truck and obtains an $8,000 loan at 10% interest, how much more will the monthly payments be with a three-year loan than with a four-year loan? $ _____.

2. If a famer purchases a new fiberglass silo and finances $28,000 at 9% interest for 15 years, the monthly payment will be $283.92. How much less would the monthly payments be if the loan was financed for 20 years at the same interest rate? $ _____.

3. A farmer is planning to purchase 30 acres of land for $45,000. He can pay down $4,500 and get a 30-year loan at 10% interest for the remainer, or he can pay down $9,000 and get a 15-year loan at 9% interest for the remainer. How much more will the total cost of the land be if he decides to obtain the 30-year loan? $ _____.

ANSWER KEY FOR MODULE TITLED "RATIOS AND PROPORTIONS"

Module Training Unit:

(1.) $ 252 (2.) $ 24 (3.) 18
(4.) John = $ 556.25 Joe = $1,668.75 Sally = $ 2225.00
(5.) Wheat = 400 Soybeans = 1200 Corn = 1800
(6.) Woodland = 120 Cropland = 320 Pasture = 240
House and Buildings = 40

Competency #017 Worksheet:

(1.) 92.5 (2.) $0.24

Competency #023 Worksheet:

(1.) $ 55.20 (2.) $ 31.92 (3.) $ 57,805.20